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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/910,732	07/24/2001	Peter Schramm	012050-077	1789
27045	7590	03/23/2006		EXAMINER
ERICSSON INC. 6300 LEGACY DRIVE M/S EVR C11 PLANO, TX 75024				MERED, HABTE
			ART UNIT	PAPER NUMBER
				2616

DATE MAILED: 03/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/910,732	SCHRAMM, PETER	
	Examiner Habte Mered	Art Unit 2662	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 17 January 2006.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1,3,4,6-41,43-46 and 48-67 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) 1,3,4,6-40 and 67 is/are allowed.  
 6) Claim(s) 41,43-46, 48-53, 55, and 60-66 is/are rejected.  
 7) Claim(s) 54 and 56-59 is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 07/24/2001 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

1. The amendment filed on 01/17/2006 has been entered and fully considered.
2. Claims 1, 3, 4, 6-41, 43-46, 48-67 are pending. Claims 2, 5, 42, and 47 are cancelled.
3. The indicated allowability of claims 53-59 and 60-66 are withdrawn in view of the newly discovered reference(s) to Baum et al (US 5, 867, 478), Sayeed (US 6, 456, 653), and Marchok et al (US 6, 690, 680). Rejections based on the newly cited reference(s) follow. Further, as indicated below claims 41, 43-46, 48-52 and 60-66 are also subject to a 101 non-statutory rejection as detailed below.

### *Claim Objections*

4. **Claims 53 and 60** are objected to because of the following informalities:

The following limitation in these claims need to be rephrased by not repeating the phrase “respective subcarrier in the respective OFDM symbol”: ...” said noise sample estimates for each subcarrier in each OFDM symbol on the basis of the respective received signal sample on the respective subcarrier in the respective OFDM symbol, of subcarrier symbol information about the subcarrier symbol transmitted on the respective subcarrier in the respective OFDM symbol, and of the channel coefficient estimate on the respective subcarrier.” . Based on the support provided in the specification the Examiner understands this limitation only to mean noise sample estimates are done for each subcarrier in each OFDM symbol on the basis of the received signal, subcarrier symbol information on the transmitted signal, and channel coefficient estimate. Appropriate correction is required.

***Claim Rejections - 35 USC § 101***

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. **Claims 41, 43-46, 48-52 and 60-66** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 41 and 43-45 indicate calculations will be performed to determine link quality, signal power variation, and noise power but these claims fail to disclose what physical action or change will occur as a result of making these calculations. Claims 46 and 48-52 indicate calculations will be performed to determine link quality, signal-to-noise variation, channel coefficients, noise sample estimates, and signal-to-noise variance but these claims fail to disclose what physical action or change will occur as a result of making these calculations. Claims 60-66 indicate calculations will be performed to determine noise sample estimate and noise power but these claims fail to disclose what physical action or change will occur as a result of making these calculations.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. **Claims 41 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baum et al (US 5, 867, 478), hereinafter referred to as Baum, in view of Sayeed (US 6, 456, 653).**

Baum teaches a system based on a plurality SC-OFDM transmitters and a plurality of receivers.

8. Regarding **claim 41**, Baum discloses a link quality determination method for determining a link quality of a transmission link between an OFDM transmitter and an OFDM receiver of an OFDM transmission system (**See Figure 14**) comprising the following steps: determining the signal power variation (**Baum determines the signal power variation in the form of signal covariance matrix is given by the equation in Column 16, Line 33. For further discussion see Column 16, Lines 23-32;**) and determining at least a first link quality measure on the basis of the determined signal power variation (**The first link quality is given by the expression in Column 16, Line 50. For further discussion see Column 16, Lines 54-58;**) and determining a second link quality measure representing the average subcarrier signal-to-noise power ratio (**Baum shows on column 18, Line 55 an equation indicating signal-to-noise power ratio and indicates in Column 18, Lines 62-67 and Column 17, Lines 55-67.)**

Baum fails to expressly disclose how a noise power is determined.

Sayeed discloses a method and apparatus for estimating the signal-to-noise ratio in OFDM system

Sayeed discloses how a noise power is determined. (**See Column 5, Lines 55-65)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Baum's method to incorporate a noise power determining method. The motivation of knowing how to determine a noise power is crucial for a receiver in that it aids in quantifying the noise in a received noise corrupted signal and such knowledge helps the receiver easily recover the original transmitted signal.

9. Regarding **claim 43**, Baum disclose a link quality determination method, further comprising the steps of: determining the second link quality measure at several instances during a frame or during bursts (**See Column 8, Lines 29-35 and 46-52; Column 11, Lines 9-12; Column 18, Lines 9-12 and 55-56**); and determining a modified second link measure as a cumulative density function (**Column 18, Line 55**).

10. **Claims 53, 55, and 60** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sayeed (US 6, 456, 653) in view of Marchock et al (US 6, 690, 680), hereinafter referred to as Marchock.

11. . Regarding **claims 53 and 60**, Sayeed discloses a method and a processing device of an OFDM system including a noise power determination unit (**Figure 3, elements 320, 330b, 340 and 350 as a an entity can be considered a noise power determination unit**) adapted to determine the noise power of a received signal in an OFDM system, comprising: a noise sample estimate determining unit (**In Figure 3, elements 330b and 320**) which is adapted to determine a noise sample estimate for

each subcarrier in each OFDM symbol; and a noise sample averaging unit which is adapted to determine the noise power by averaging the noise sample estimate power over one or more subcarriers (**In Figure 3, elements 350 and 340**); and wherein the noise sample estimate determining unit is adapted to determine the noise sample estimates for each subcarrier in each OFDM symbol on the basis of the respective received signal sample, the subcarrier symbol information about the subcarrier symbol transmitted and the channel coefficient estimate on the respective subcarrier . (**The noise sample estimates in Figure 3 are based on the received signal, which has to contain subcarrier symbol information and data symbol as well as noise, and it is inherent to any OFDM system to calculate the channel coefficient estimate in the FFT/DFT. The sampling is done for each subcarrier in each OFDM symbol as seen from the equation in Column 5, Line 60 and is done in the frequency domain.**)

Sayeed fails to disclose a sampling technique that involves averaging over one or more OFDM symbols.

*Marchock teaches synchronization between a receiver and a transmitter in an OFDM/DMT system.*

Marchock discloses a sampling technique that involves averaging over one or more OFDM symbols. (**Marchock discloses averaging a power calculation for each subcarrier and OFDM symbols. See Column 9, Lines 5-20**)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Sayeed's method to incorporate a sampling technique that involves averaging over one or more OFDM symbols. The motivation of using such a sampling technique is to get a very accurate averaging process as the technique increases the number of samples used by a factor of the product of the number of symbols used and the number of subcarriers used in determining the average.

12. Regarding **claim 55**, Sayeed discloses a processing device, wherein the OFDM symbols are transmitted in bursts of a frame; each burst comprises a preamble part and one or more protocol data units and each preamble part of each burst comprises one or more OFDM training symbols used by the channel coefficient estimator for the channel estimation. (**This limitation is basic and inherent to all OFDM systems such as Sayeed's because the design of an OFDM receiver is based on knowing receiving training and pilot symbols for the sole purpose of signal estimation.**)

***Allowable Subject Matter***

13. **Claims 1, 3, 4, 6-40, and 67** are allowed.  
14. **Claims 54, and 56- 59** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

15. The following is a statement of reasons for the indication of allowable subject matter:

- Claims 1, 3, 19, 35, and 37-40 are allowable over the prior art of record since the cited references, taken individually or in combination, fail to particularly

teach or suggest a link quality determination unit that has a signal power variation determining unit which is adopted to determine the signal power variation as the signal power variance by determining the difference between the power of the estimated channel coefficients on the respective subcarrier and the signal power, by determining the absolute value of the difference, by squaring the absolute value of the difference, and by averaging the squared absolute value over a plurality of subcarriers.

- Claims 4, 6-18, 20-34, 36, and 67 are allowable over the prior art of record since the cited references, taken individually or in combination, fail to particularly teach or suggest a link quality determination unit that has a signal-to-noise variation determining unit that is adopted to determine the signal-to-noise variation as the signal-to-noise variance by determining a SNR mean value by respectively summing the power of the channel estimation coefficients and the power of the noise samples over the plurality of subcarriers and by forming the ratio thereof and by determining the ratio of the power of the respective channel coefficient estimate for the respective subcarrier to the power of the respective noise sample estimate for the respective subcarrier, by subtracting from this ratio the SNR mean value, determining the absolute value of the subtraction result, squaring the absolute value and averaging the determined absolute values over a plurality of subcarriers.

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- Regarding 54 56-59 the cited references, taken individually or in combination, fail to particularly teach or suggest a processing device that has a noise sample estimate determining unit in an OFDM system wherein the noise sample estimate determining unit comprises a multiplier for multiplying the channel coefficient estimate on the respective subcarrier with the subcarrier symbol information a subtractor for subtracting the multiplication result from the respective received signal sample, the output of the subtractor constituting the noise sample estimates for each subcarrier in each OFDM symbol.

***Response to Arguments***

16. Applicant's remarks filed 01/17/2006 have been fully considered. In view of the Office withdrawing the allowability of claims indicated allowable in the previous Office Action dated 10/31/2005, the Applicant's remarks are no longer pertinent. Examiner apologizes for any inconvenience.

***Conclusion***

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Habte Mered whose telephone number is 571 272 6046. The examiner can normally be reached on Monday to Friday 9:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on 571 272 3088. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

03-17-2006  
HM



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